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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
ROSENBERGER, FREDERICK F	
ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 04/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/716,367	LACEY ET AL.
	Examiner	Art Unit
	Frederick F. Rosenberger	2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-14 and 16-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3,5-14 and 16-20* is/are rejected.

7)☒ Claim(s) *4* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's reply, filed 6 February 2006, has been received and entered. Accordingly, claims 1, 3, and 10 have been amended. Claims 2 and 15 have been cancelled. No new claims have been added. Thus, claims 1, 3-14, and 16-20 are currently pending in this application.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1, 3, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshioka (Japanese Publication # 61-201182A) in view of Pohan et al. (US Patent # 6,925,142).

Yoshioka discloses a detector assembly for use in a computed tomography scanner, the detector assembly comprising:

A detector array **10** (Figures 1 and 2);

A temperature sensor **S3** coupled to the center of the detector array **10** and temperature sensors **S1** and **S2** coupled to the opposing ends of the detector array **10**;

A heater **H3** coupled to a center portion of the detector array **10** and heating elements **H1** and **H2** coupled to the opposing ends of the detector array **10**;

And a controller device **11a, 11b, 11c** electrically coupled to the temperature sensors to receive an actual temperature signal, the controller device comparing the actual temperature signal to a set point and driving the heater to maintain the heaters **H1-H3** to maintain the actual temperature substantially at set point, thus providing a uniform temperature profile along the array (Figure 3 and page 6 of the translation, lines 3-6).

Yoshioka is silent with regards to the use of thermoelectric coolers at the opposing ends of the detector array, instead opting for surface heaters with no definition of variations.

However, it is well known in the art that thermoelectric coolers are capable of being used in place of standard heaters as a heating/cooling element. For example,

Pohan et al. disclose an X-ray CT detector wherein heating elements **11** have been coupled to a detector array **7** through printed circuit board **6** (Figure 2) for controlling the temperature of the detector array **7**. Pohan et al. point out that these heating elements can take the form of Peltier devices (i.e. thermoelectric coolers) (column 4, lines 23-27). Further, Pohan et al. disclose that the use of thermoelectric coolers in such a temperature control setup is desirable since the added functionality of the thermoelectric cooler allows for cooling the detector array and the regulating electronics should the temperature of those elements become too high (column 2, lines 25-29).

Thus, it would have been obvious for a person of ordinary skill in the art to change at least one of the outlying heaters **H1** and **H2** of Yoshioka to thermoelectric coolers, along with the appropriate controller modifications, to enable cooling of the detector array when ambient temperatures are too high, as taught by Pohan et al.

5. Claims 5, 6, 12, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable Yoshioka and Pohan et al., as applied to claims 1 and 10 above, and further in view of internet document entitled "Designing with Thermoelectric Coolers" (hereinafter referred to as Design Guide) and "Thermoelectric Reference Guide-Heat Sink Considerations" (hereinafter referred to as Ferrotec).

Yoshioka and Pohan et al. disclose all the limitations of the parent claims 1 and 10, as described above. However, the combination of Yoshioka and Pohan et al. are silent with regards to the method for heat dissipation from the thermoelectric cooler.

It is well known in the art that the use of a thermoelectric cooler requires the use of some form of heat dissipation method, whether natural or active heat dissipation. As Design Guide points (page 3, entitled "What is the required balance system needed to enable a TEC?"), without a suitable heat dissipation method to remove heat from the hot side, the thermoelectric cooler will eventually overheat and fail. Acceptable heat dissipation methods include natural convection extruded fins (i.e. traditional heat sink), forced convection fins stack (i.e. fan directing air at a heat sink), or a fluid cooling heat exchanger. Ferrotec also points out that the particular selection of an appropriate heat dissipation method is dependent upon the particular application. Lower power applications require only a natural convection heat sink (section 5.2.1) while higher power applications (i.e. those that require more heat removal) require at least forced convection heat sinks (section 5.2.2).

Thus, it would have been obvious to a person having ordinary skill in the art at the time the invention was made to apply heat dissipation methods, either passive heat sinks via natural convection or active heat sinks through directed fans, for the thermoelectric coolers, to prevent failure of the thermoelectric coolers, as taught by Design Guide and Ferrotec.

6. Claims 7, 8, and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshioka, Pohan et al., Design Guide and Ferrotec, as applied to claim 5 above, and further in view of Snyder et al. (US Patent # 6,249,563).

The combination of Yoshioka, Pohan et al., Design Guide, and Ferrotec discloses all of the limitations of parent claim 5, as described above, and most of the limitations of claims 16-20. However, the combination is silent with regards to rails being coupled to opposing sides of the detector array with a conductive insert coupled to one of the rails for transferring heat along the rail.

Snyder et al. teach a temperature control method for an X-ray detector employing a pair of rails **42a**, **42b** (Figure 3) mounted on opposing sides of a detector array **39** with conductive inserts **46** along the length of the rails enabled for transferring heat along the length of the array (column 5, lines 3-9). As Snyder et al. illustrate, such a configuration enables the rapid transfer of heat from detector locations at different temperatures, thereby encouraging an isothermal condition among the detector array elements (column 5, lines 12-17).

Thus, it would have been obvious to a person having ordinary skill in the art to modify the combination of Yoshioka, Pohan et al., Design Guide, and Ferrotec, to include a pair of rails with conductive inserts to enhance heat distribution along the entire length of the detector array and assist in the maintenance of a uniform temperature profile, as taught by Snyder et al.

With regards to claim 8, although Snyder et al. teach a conductive insert which is a fluid filled heat pipe, the particular selection of the conductive insert material is an obvious matter of design choice since applicant has not disclosed that the particular material selection solves any stated problem or is for any particular purpose and it

appears that the invention would perform equally well with a fluid filled heat pipe with high thermal conductivity, as proposed by Snyder et al.

With regards to claim 20, Yoshioka demonstrates that the temperature in the center of the detector (Figure 3 – location **III**) is higher than it would be at the extreme ends of the detector array (Figure 3, to the left of location **I** and to the right of location **II**).

7. Claims 9 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshioka and Pohan et al., as applied to claims 1 and 10 above, and further in view of Sasaki et al. (US Patent # 6,411,672).

The combination of Yoshioka and Pohan et al. discloses all of the limitations of parent claims 1 and 10, as described above. However, the combination is silent with regards to providing an insulating cover for housing the detector array from ambient thermal variations.

Sasaki et al. teach a radiation detector for X-ray CT applications wherein the detector array **25** (Figure 2) is encased in a case **17** with insulation **21**. The insulation is configured such that it is in thermal communication with all edges of the detector array through the working fluid except for a window **16** (Figures 3) on the top of the detector array. Such a setup enables a uniform internal temperature with high thermal conductivity in the interior of the detector assembly while enabling high insulation with respect to the exterior of the detector assembly (column 3, lines 39-45).

Thus, it would have been obvious for a person having ordinary skill in the art to modify Yoshioka and Pohan et al. to include an insulating cover for housing the detector

array from ambient conditions so as to better maintain an internal isothermal condition, as taught by Sasaki et al.

8. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshioka and Pohan et al., as applied to claim 10 above, and further in view of Snyder et al. (US Patent # 6,249,563).

The combination of Yoshioka and Pohan et al. discloses all of the limitations of parent claim 10, as described above. However, the combination is silent with regards to a heat conductive material coupled along the length of the detector array for transferring heat.

Snyder et al. teach a temperature control method for an X-ray detector employing a pair of rails **42a**, **42b** (Figure 3) mounted on opposing sides of a detector array **39** with conductive inserts **46** as heat conductive material coupled along the length of the rails enabled for transferring heat along the length of the array (column 5, lines 3-9). As Snyder et al. illustrate, such a configuration enables the rapid transfer of heat from detector locations at different temperatures, thereby encouraging an isothermal condition among the detector array elements (column 5, lines 12-17).

Thus, it would have been obvious to a person having ordinary skill in the art to modify the combination of Yoshioka, Pohan et al., Design Guide, and Ferrotec, to include a pair of rails with conductive inserts as heat conductive material to enhance heat distribution along the entire length of the detector array and assist in the maintenance of a uniform temperature profile, as taught by Snyder et al.

Allowable Subject Matter

9. Claim 4 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter: The reasons for allowance have been indicated in the previous Office action.

Response to Arguments

11. Applicant's arguments filed 6 February 2006 have been fully considered but they are not persuasive.

12. With respect to the rejections based on Yoshioka and Pohan, applicant primarily makes the following arguments:

A) Yoshioka teaches heating the array and thus teaches away from adding cooling elements (page 8, first full paragraph).

B) Neither Yoshioka nor Pohan suggest both cooling and heating the array (page 8, second full paragraph; page 9, top).

C) The present invention does not use the thermoelectric cooler to cool the array when ambient temperatures are too high, but rather to cool parts of the array while heating others.

13. With regards to argument A, in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

The primary motivation in Yoshioka is to maintain a uniform temperature profile across the detector array by modulating the heat flux in different regions of the detector array, through separate discrete heating elements. There is no specific preclusion in Yoshioka from using cooling to achieve this variable heat flux. Pohan teaches that a thermoelectric cooler can be used to heat a detector array. Further, Pohan teaches that using a thermoelectric cooler provides the added functionality of cooling for the detector electronics, as discussed in the rejection above. Yoshioka does not prohibit the use of thermoelectric coolers (TECs) just because TECs can have added functionality. Rather, the TECs can just as easily provide the heating function required by Yoshioka. Thus, it is the combination of the references that must be evaluated. In this regard, the rejection of the claims based on Yoshioka and Pohan is deemed to be proper.

Further, the language of the claims does not require the thermoelectric cooler to necessarily only provide cooling. As recited, the thermoelectric cooler can selectively heat or cool the detector array. If the thermoelectric cooler is chosen to provide heating to maintain a given temperature profile, functionally the thermoelectric cooler is equivalent to the heater of Yoshioka. And as Pohan points out, it is obvious to

substitute a thermoelectric cooler, in said instance, to provide the added functionality of cooling.

14. With regards to argument B, it is submitted that the functionality of a thermoelectric cooler to provide heating or cooling is inherent to the structure of the thermoelectric cooler. Pohan recites in column 2, lines 25-29, "Advantageously, the heating element is a resistance heating element or a Peltier element. Given employment of a Peltier element, it is also possible to cool the sensor array and the regulating electronics." This is not interpreted to convey only either heating or cooling the array. Rather, Pohan is illustrating that the inclusion of a thermoelectric cooler provides the added functionality of cooling in addition to heating. As such, Pohan would enable greater control of the heat flux in the particular regions of the detector array of Yoshioka. Again, it is noted that the references must be analyzed in combination and not individually. Yoshioka teaches better temperature profile control by manipulating the heaters in separate regions while Pohan teaches added functionality and temperature control by replacing the heaters with thermoelectric coolers.

15. With regards to argument C, in response to applicant's argument that the thermoelectric cooler of the claimed invention does not cool the array when ambient temperatures are too high, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte*

Obiaya, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). In this case, Pohan does suggest using a thermoelectric cooler to cool the array when temperatures run too high. Thus, the provision of a thermoelectric cooler would allow maintenance of the selected temperature profile.

16. With respect to the rejections based on Design Guide and Ferrotec documents, applicant primarily makes the following arguments:

D) The Design Guide cannot be relied upon as a prior art document because there is no proof that document was disseminated.

E) The Ferrotec document cannot be relied upon as a prior art document because there is no publication date.

17. With regards to arguments D and E, said references have been cited to demonstrate knowledge regarding thermoelectric coolers that is well known in the art. The use and selection of heat sinks with thermoelectric coolers is essential in their operation, as both references point out. Such knowledge was not new in the art at the time the invention was made. Applicant is referred to the documents cited with the current action and described below, which detail the use of active and passive heat sinks with thermo-electric coolers over the last decade.

Further, it is submitted that both documents would qualify as published documents as established by the MPEP. The Design Guide document was disseminated via the Internet and has been catalogued via the Internet archives (see

http://www.archive.org/web/web.php) as far back as June 2002 (from http://web.archive.org/web/20020604065009/http://www.enertron-inc.com/, click on the link labeled *Reference Library* and then *Designing with Thermoelectric Coolers*). Similarly, the Ferrotec document was also disseminated via the Internet and has been catalogued via the Internet archives as far back as November 2002 (from http://web.archive.org/web/20021120043442/http://www.ferrotec.com/, click on the link *USA Santa Clara, CA*, then *Thermoelectric Modules*, then *For information on Thermoelectric Products Click Here*, then *Technical Reference*, and *5.0 Heat Sink Considerations*). As mentioned above, both documents are relied upon to describe conventional knowledge in the art and design of thermoelectric cooler systems. The cited patents provide further basis for this knowledge prior to applicant's priority date.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Eckhouse et al. (US Patent # 5,849,029) disclose the use of a thermoelectric cooler to cool a system **12**. Specifically, Eckhouse et al. disclose using a heat sink **42** coupled to the thermoelectric cooler **40** (Figure 3) in order to provide more rapid cooling and improved efficiency. Further, Eckhouse et al. teach that a fan and cooling fins may be provided to enhance cooling efficiency (column 7, lines 7-15).

Ward (US Patent # 5,537,825) discloses the use of a thermoelectric cooler to cool a system. Ward teaches that the use of heat sink **40** and fins **42** along with

exhaust fan **46** accelerates the heat removal from the hot side of the thermoelectric cooler **30** (Figure 1; column 2, line 64 – column 3, line 4), thereby improving cooling efficiency.

Doke et al. (US Patent # 5,367,879) disclose that using a fan with a thermoelectric cooler can improve efficiency, thereby improving heating or cooling capacity (column 3, lines 11-18). Doke et al. also note that thermoelectric devices can operate as either coolers or heaters (column 1, lines 43-46).

Hazen (US Patent # 5,040,381) disclose a thermoelectric cooler and heat sink module. Hazen discloses that a fan may be included to force air through the heat sink (column 3, lines 5-7).

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Frederick F. Rosenberger whose telephone number is 571-272-6107. The examiner can normally be reached on Monday-Friday 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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